

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L2	4493	electro\$4 and (metallic adj compound) and temperature	US-PGPUB; USPAT	OR	ON	2005/04/26 11:31
L3	195	electro\$4 same (metallic adj compound) same temperature	US-PGPUB; USPAT	OR	ON	2005/04/26 12:00
L4	160	3 and @ad<"20020805"	US-PGPUB; USPAT	OR	ON	2005/04/26 11:33
L5	102	4 and organic	US-PGPUB; USPAT	OR	ON	2005/04/26 12:00
L6	478	electro\$4 same (metallic adj compound) same temperature	USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2005/04/26 12:00
L7	198	6 and organic	USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2005/04/26 12:00

PAT-NO: JP409045230A

DOCUMENT-IDENTIFIER: JP 09045230 A

TITLE: FORMATION METHOD FOR CONDUCTIVE FILM, AND
MANUFACTURE OF
ELECTRON EMITTING ELEMENT

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Abstract Text - FPAR (1):

PROBLEM TO BE SOLVED: To easily form a conductive film consisting of a metallic oxide excellent in equality of film thickness by applying organic metallic compound solution not less than the fusing point and not more than the resolution temperature, and then, baking it at the resolution temperature or over.

Abstract Text - FPAR (2):

SOLUTION: Element electrodes 4 and 5 are made on an insulating substrate 1 by a vacuum deposition method or a lift-off method, and thereon the pattern of a Cr film 7 is made. This substrate 1 is heated to not less than the fusing point of the organic metallic compound of center metal such as Pd, etc., and not more than the resolution temperature, using an infrared ray lamp 4, etc. Hereon, the above organic metallic compound solution is applied to form the film 11. Next, these are put in an oven 12, and are baked at the resolution temperature or over to form a conductive film 13 consisting of metallic oxides such as PdO, etc. Then, the Cr film 7 is removed, and voltage is applied to partially break or transform or transmute it so as to form an electrically highly resistant electron emitting part, thus an electron emitting element with little dispersion of electron emitting property is obtained.

US-PAT-NO: 5603983

DOCUMENT-IDENTIFIER: US 5603983 A

TITLE: Process for the production of conductive and magnetic
transitin metal oxide coated three dimensional substrates

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Brief Summary Text - BSTX (15):

Gonzalez-Oliver, C. J. R. and Kato, I. in "Sn (Sb)-Oxide Sol-Gel Coatings of Glass," Journal of Non-Crystalline Solids 82(1986) 400-410 North Holland, Amsterdam, describe a process for applying an electrically conductive coating to glass substrates with solutions containing tin and antimony. This coating is applied by repeatedly dipping the substrate into the solution or repeatedly spraying the solution onto the substrate. After each dipping or spraying, the coated substrate is subjected to elevated temperatures on the order to 550.degree. C.-600.degree. C. to fully condense the most recently applied layer. Other workers, e.g., R. Pryane and I. Kato, have disclosed coating glass substrates, such as electrodes, with doped tin oxide materials. The glass substrate is dipped into solution containing organo-metallic compounds of tin and antimony. Although multiple dippings are disclosed, after each dipping the coated substrate is treated at temperatures between 500.degree. C. and 630.degree. C. to finish off the polycondensation reactions, particularly to remove deleterious carbon, as well as to increase the hardness and density of the coating.

Brief Summary Text - BSTX (34):

Calcined powders can be formed into different shapes and configurations by various forming techniques including dry pressing, tape casting, screen printing and extrusion. The dry pressing method has been used to fabricate bulk superconducting parts with dimensions ranging from 90.1 to 20 c.m. Superconducting wires have been prepared by extrusion. Superconducting ceramic tapes (-20 to 100 um thick) have been prepared by a tape casting technology similar to that used in fabrication of multilayer ceramic capacitors and ceramic packages for integrated circuits. Layers of superconducting and insulating tapes can be laminated to form multilayer device structure. Superconducting lines and pads have been prepared by the screen printing process. A viscous paste is first formed by mixing a superconducting powder with organic binders. The paste is then printed through a patterned

fine-meshed screen onto a substrate to form thick film superconducting patterns having -5 to 20 um thickness.

Brief Summary Text - BSTX (67):

The transition metal which is contacted with the substrate is in a vaporous phase or state, or in a liquid phase or state, or in a solid state or phase (powder) at the time of the contacting. The composition which includes the transition metal chloride preferably also includes the interacting component or components. This composition may also include one or more other materials, e.g., dopants, catalysts, grain growth inhibitors, solvents, etc., which do not substantially adversely promote the premature hydrolysis and/or oxidation of the transition metal chloride and/or the interacting component, and do not substantially adversely affect the properties of the final product, such as by leaving a detrimental residue in the final product prior to the formation of the transition metal oxide-containing coating. Thus, it has been found to be important, e.g., to obtaining a transition metal oxide coating with good structural, mechanical and/or electronic and/or magnetic properties, that undue hydrolysis of the transition metal chloride and interacting component be avoided. This is contrary to certain of the prior art which actively utilized the simultaneous hydrolysis reaction as an approach to form the final coating. Examples of useful other materials include organic components such as acetonitrile, ethyl acetate, dimethyl sulfoxide, propylene carbonate and mixtures thereof; certain inorganic salts and mixtures thereof. These other materials, which are preferably substantially anhydrous, may often be considered as a carrier, e.g., solvent, for the transition metal chloride and/or interacting component to be contacted with the substrate.

Brief Summary Text - BSTX (69):

As set forth above the transition metal oxide precursor is preferably selected from the group consisting of one or more transition metal chlorides, organic complexes, organic salts, particularly organic complexes and salts which do not adversely oxidize and/or hydrolyze under the conditions of coating the substrate with the transition metal oxide precursor and mixtures thereof. Particularly preferred precursors are transition metal chlorides and organic complexes, particularly di-ketone type complexes, i.e., acetylacetonate complexes. It is preferred that the precursors have a temperature range between its melting point and boiling point, which allows for effective maintaining and equilibrium of the precursor coating as more specifically set forth above. For example, stannous chloride is preferred over stannic chloride due to the wide temperature range from melting point to boiling point of stannous chloride. As set forth above, the preferred complexes are polyfunctional complexes, i.e., di-ketone complexes, preferred organic

complexes and salts are precursors which do not undergo adverse rapid hydrolysis and/or oxidation and/or require undue pyrolyses of the organic carbon portion of the complex or salt and prior to and/or during the maintaining equilibrium step of the process of this invention and/or prior to the oxidation step for conversion to the transition metal oxide. In addition, such polyfunctional complexes, i.e., ketone complexes are preferred over organic acid and/or alcoholate transition metal salts.

Brief Summary Text - BSTX (76):

Typical transition metal oxide precursor powders are those that are powders at powder/substrate contacting conditions and which are liquidous at the maintaining conditions, preferably equilibration conditions, of the present process. It is preferred that the powder on melting substantially wets the surface of the substrate, preferably having a low contact angle formed by the liquid precursor in contact with the substrate and has a relatively low viscosity and low vapor pressure at the temperature conditions of melting and maintaining, preferably melting within the range of about 100.degree. C. to about 650.degree. C. or higher. For tin oxide precursor powder it is preferred that melting is within the range of from about 100.degree. to about 450.degree., more preferably about 250.degree. C. to about 400.degree. C. Typical powder transition metal oxide precursors are stannous chloride, low molecular weight organic salts or complexes of tin, particularly low molecular weight organic salts and complexes such as stannous acetate and acetylacetonate complexes of tin.

Brief Summary Text - BSTX (78):

Typical zinc oxide precursor powders are those that are powders at powder/substrate contacting conditions and which are liquidous at the maintaining conditions, preferably equilibration conditions, of the present process, preferably melting within the range of about 100.degree. C. to about 450.degree. C., or higher, more preferably about 250.degree. C. to about 400.degree. C. Typical powder zinc oxide precursors are zinc chloride, low molecular weight organic salts or complexes of zinc, particularly low molecular weight organic salts and complexes such as zinc acetate and acetylacetonate complexes of zinc.

Brief Summary Text - BSTX (80):

Typical copper oxide precursor powders are those that are powders at powder/substrate contacting conditions and which are liquidous at the maintaining conditions, preferably melting within the range of about 100.degree. C. to about 650.degree. C., more preferably about 435.degree. C. to about 630.degree. C. Typical powder copper oxide precursors are cuprous

chloride, cuprous oxide low molecular weight organic salts or complexes of copper, particularly low molecular weight organic salts and complexes including poly functional/carboxyl, hydroxyl and ketone such as cuprous acetate and acetylacetonate complexes of copper.

Brief Summary Text - BSTX (85):

The powder transition metal oxide precursor on melting is maintained and/or equilibrated as set forth above. In addition, temperatures can be adjusted and/or a component introduced into the melting/maintaining step which can aid in altering the precursor for enhanced conversion to transition metal oxide. For example, gaseous hydrogen chloride can be introduced to form partial or total halide salts and/or the temperature can be adjusted to enhance decomposition of, for example, transition metal organic salts and/or complexes to more readily oxidizable transition metal compounds. The interacting component can also be present in an oxide or precursor form in the melt as a dispersed preferably as a finely dispersed solid. The oxide can be incorporated advantageously as part of the powder coating of the substrate material.

Brief Summary Text - BSTX (94):

Particularly useful dopant components for use in the zinc oxide products and process of the present invention are selected from aluminum, cobalt, gallium, titanium, indium, tin and germanium, particularly oxide forming dopant components, as well as zinc metal forming compounds and/or the use of such process condition which form dopant concentrations of zinc metal. Preferred dopant oxide precursors are set forth above and include the halide, preferably the chlorides, organic complexes, such as low molecular weight organic acid salts, complexes, such as low molecular weight, ketone components, preferably 2, 4, dienes, benzylates and the like. The preferred dopants are those that provide for optimum dopant oxide incorporation while minimizing dopant precursor losses, particularly under the preferred process condition as set forth herein. Oxides or suboxides can also be used where dopant incorporation is accomplished during the oxidation sintering contacting step.

Brief Summary Text - BSTX (96):

Any suitable conductivity compatible and/or enhancing component may be employed in the copper oxide product and processes of this invention. Such conductivity interacting component should provide sufficient stoichiometry so that the final copper oxide coating has the desired properties, e.g., electronic conductivity, stability, etc. Chloride, nitrate, sulfate, organic complexes as set forth above and their hydrate components are particularly useful additional components with oxide, peroxide and carbonates being also

useful. Care should be exercised in choosing the additional component or components for use. For example, the components should be sufficiently compatible with the cuprous chloride so that the desired conductive copper oxide coating can be formed.

Brief Summary Text - BSTX (98):

Any suitable interacting-forming component may be employed in the iron oxide products and processes of this invention. Such interacting-forming component should provide sufficient concentration so that the final iron oxide coating has the desired properties, e.g., magnetic, high permeability, stability, for example, nickel, manganese or zinc components. Preferred iron component oxide precursors are set forth above and include the halide, preferably the chlorides, organic complexes, such as low molecular poly functional organic acids, complexes, such as low molecular weight, ketone components, preferably 2, 4, ketones, benzylates and the like. The preferred interacting components are those that provide for optimum oxide incorporation while minimizing dopant precursor losses, particularly under the preferred process condition as set forth herein. Oxides or suboxides can also be used where dopant incorporation is accomplished during the oxidation sintering contacting step.

Brief Summary Text - BSTX (104):

In addition, if chlorides or organic precursors of iron are used, such precursor components are converted to oxides during the oxidizing agent/substrate contacting step. This enhances the overall utilization of the coating components in the present process.

Brief Summary Text - BSTX (108):

The substrate may be composed of any suitable inorganic material and may be in any suitable form. Preferably, the substrate is such so as to minimize or substantially eliminate deleterious substrate, coating reactions and/or the migration of ions and other species, if any, from the substrate to the transition metal oxide-containing coating which are deleterious to the functioning or performance of the coated substrate in a particular application. However, controlled substrate reaction which provides the requisite stoichiometry can be used and such process is within the scope of this invention. In addition, it can be precoated to minimize migration, for example an alumina and/or a silica precoat and/or to improve wettability and uniform distribution of the coating materials on the substrate. Further, the transition metal oxide component, article can be further coated with a barrier film, organic and/or inorganic to minimize reaction of components such as corrosive gaseous materials with the final transition metal oxide component/article. In order to provide for controlled electrical conductivity

in the conductive transition metal oxide coating, it is preferred that the substrate be substantially non-electronically conductive and/or non-deleterious reactive and/or substantial non-magnetic when the coated substrate is to be used as a component of an electric energy storage battery, acoustic device and/or magnetic device. In one embodiment, the substrate is inorganic, for example metal, glass and/or ceramic and/or carbon. Although the present process may be employed to coat two dimensional substrates, such as substantially flat surfaces, it has particular applicability in coating three dimensional substrates. Thus, the present process provides substantial process advances as a three dimensional process. Examples of three dimensional substrates which can be coated using the present process include spheres, such as having a diameter of from about 1 micron to about 500 microns more preferably from about 10 microns to about 150 microns, extrudates, flakes, single fibers, fiber rovings, chopped fibers, fiber mats, porous substrates, irregularly shaped particles, e.g., catalyst supports, multi-channel monoliths tubes, conduits and the like. Acid resistant inorganic substrate, especially woven and non-woven mats of acid resistant glass fibers and particle type shapes set forth above, are particularly useful substrates when a doped tin oxide coated substrate is to be used as a component of a battery, such as a lead-acid electrical energy storage battery. More particularly, the substrate for use in a polymer composite can be in the form of particle type shapes set forth above and/or a body of woven or non-woven fibers, still more particularly, a body of fibers having a porosity in the range of about 60% to about 95%. Porosity is defined as the percent or fraction of void space within a body of fibers. The above-noted porosities are calculated based on the fibers including the desired fluorine doped transition metal oxide coating.

Brief Summary Text - BSTX (140):

Any suitable matrix material or materials may be used in a composite with the transition metal oxide coated substrate. Preferably, the matrix material comprises a polymeric material, e.g., one or more synthetic polymers, more preferably an organic polymeric material. The polymeric material may be either a thermoplastic material or a thermoset material. Among the thermoplastics useful in the present invention are the polyolefins, such as polyethylene, polypropylene, polymethylpentene and mixtures thereof; and poly vinyl polymers, such as polystyrene, polyvinylidene difluoride, combinations of polyphenylene oxide and polystyrene, and mixtures thereof. Among the thermoset polymers useful in the present invention are epoxies, phenol-formaldehyde polymers, polyesters, polyvinyl esters, polyurethanes, melamine-formaldehyde polymers, and urea-formaldehyde polymers.

Brief Summary Text - BSTX (153):

Multi-channel monoliths are useful for a variety of applications and are particularly useful as catalyst supports and heating applications. The monolithic support is composed of many parallel channels. The channels may be circular, hexagonal, square, triangular or sinusoidal. The inside edge length of the channels and their wall thickness can be controlled during the fabrication, along with the cell geometry. These factors determine the cell density and void fraction of the monolith, as well as the geometric surface area and hydraulic diameter of the monoliths. The external geometry of the monolith support is usually determined by the use. Particularly useful catalyst applications are the reduction of nitrogen oxide from combustion sources, i.e., power generation and nitric acid plants and the reduction of organic compounds, for example hydrocarbon and carbon monoxide emissions from emission sources, such as combustion sources, including gas turbine and internal combustion engine and their use in both stationary and mobile applications. The lengths of the channels typically range from 1 centimeter to 1 meter and monoliths with diameters up to 2 meters have been formed. The external geometry of the monolith can vary and typically includes geometrical shapes, i.e., circular, square and oval. The geometric shape can be defined by its length, width, height coordinates and such coordinates can have dimensions generally from about 3 centimeter to about 130 centimeters, more preferably, from about 5 centimeters to about 60 centimeters. The geometric shape is generally selected according to the requirements for the particular process in which the monolith is to be used. While the cell density and/or wall thickness can have a great number of variations, the manufacturing methods, presently used to produce monoliths generally have minimum wall thickness of about 0.1 mm and cell density of less than 160 cells per centimeter square. Typical wall thicknesses are from about 0.15 mm to about 1.0 mm more preferably from about 0.2 mm to about 0.6 mm. Typical cell densities are from about 15 cells per square cm to about 65 cells per square cm, more preferably from about 20 cells per square cm to about 50 cells per square cm.

Brief Summary Text - BSTX (174):

In one embodiment, a porous membrane is provided which comprises a porous substrate, preferably an inorganic substrate, and a transition metal oxide-containing material in contact with at least a portion of the porous substrate. In another embodiment, the porous membrane comprises a porous organic matrix material, e.g., a porous polymeric matrix material, and a transition metal oxide-containing material in contact with at least a portion of the porous organic matrix material. With the organic matrix material, the transition metal oxide-containing material may be present in the form of an inorganic substrate, porous or substantially non porous, having a transition metal oxide-containing coating, e.g., an electronically conductive transition

metal oxide-containing coating, thereon.

Brief Summary Text - BSTX (176):

A heating element, for example, a resistance heating element, is provided which comprises a three dimensional substrate having an electrically or electronically conductive transition metal oxide-containing coating on at least a portion of all three dimensions thereof. The coated substrate is adapted and structured to provide heat in response, that is, in direct or indirect response, to the presence or application of one or more force fields, for example, magnetic fields, electrical fields or potentials, combinations of such force fields and the like, therein or thereto. An example of such a heating element is one which is adapted and structured to provide heat upon the application of an electrical potential across the coated substrate. Heating elements which are adapted and structured to provide heat in response to the presence of one or more electrical currents and/or electrical fields and/or magnetic fields therein are included in the scope of the present invention. The heat may be generated resistively. In one embodiment, a flexible heating element is provided which comprises a flexible matrix material, e.g., an organic polymeric material in contact with a substrate having an electronically conductive transition metal oxide-containing coating on at least a portion thereof. The coated substrate is adapted and structured as described above.

Brief Summary Text - BSTX (181):

A flexible electrostatic dissipation/electro-magnetic interference shielding element is also included in the scope of the present invention. This flexible element comprises a flexible matrix material, e.g., an organic polymeric material, in contact with a substrate having an electrically conductive and/or ferro magnetic transition metal oxide-containing coating on at least a portion thereof. The coated substrate of this flexible element is adapted and structured as described above.

Brief Summary Text - BSTX (192):

The porous membrane, in particular the substrate, can be predominately organic or inorganic, with an inorganic substrate being suitable for demanding process environments. The porous organic-containing membranes often include a porous organic based polymer matrix material having incorporated therein a three dimensional transition metal oxide-containing material, preferably including an electronically conductive transition metal binary oxide coating, more preferably incorporating a dopant and/or a catalytic species in an amount that provides the desired function, particularly electrical conductivity, without substantially deleteriously affecting the properties of the organic polymer matrix material. These modified polymer membranes are particularly

useful in porous membrane and/or electromembrane and/or catalytic processes.

Brief Summary Text - BSTX (195):

Porous multilayer asymmetric electronically conductive inorganic membranes, produced in accordance with this invention, are particularly advantageous for membrane applications. Among the advantages of such membranes are: stability at high temperature and/or at large pressure gradients, mechanical stability *reduced and even substantially no compaction of the membrane under pressure), stability against microbiological attack, chemical stability especially with organic solvents, steam sterilization at high temperatures, backflush cleaning at pressures of up to including a 25 atm, and stability in corrosive and oxidation environment.

Brief Summary Text - BSTX (199):

The products of this invention as described herein, are particularly useful for resistance heating applications. It has been found that the coated three dimensional and/or flexible substrates particularly spheres, flakes, fibers, fiber rovings, chopped fibers, and fiber mats, can be incorporated into polymeric matrix materials, particularly thermoplastic, thermoset and rubber based polymeric materials, as describe herein. The transition metal oxide coated substrates can be, for example, E, C, S, or T glass, silica, silica alumina, silica alumina boria, silicon carbide or alumina as example fibers, rovings, mats, chopped mats, etc. What is unexpected is the improved mechanical properties, e.g., strength coating adhesion and the like, of the coated substrates relative to the prior art substrates coated using spray pyrolysis techniques and the improved control over coating thickness to match conductivity requirements for a given resistance heating application. Whereas for many low to moderate temperature applications, organic polymer matrix materials are preferred, three dimensional products comprising, preferably primarily comprising flexible or rigid inorganic substrates coated with transition metal oxide-containing coatings have excellent high temperature performance characteristics useful, for example, in high temperature resistance heating of liquids and gases, such as air, by contact with or through (i.e., porous) such three dimensional products. Typical resistance heating applications include: heating elements or units of electric heating devices, devices for culinary purposes, warming tables, therapeutic heaters, deicing devices such as electrically heated polymer composites, low-temperature ovens such as driers, high temperature heating of gases, liquids, etc.

Brief Summary Text - BSTX (213):

In addition to electrical conductivity as set forth above, the polarizability of the transition metal oxide coating can be modified through

the addition of a component such as to enhance the overall polarizability of the transition metal oxide particle which enhanced polarizability can improve the overall electrorheological properties of the fluid. For example, the transition metal oxide coating can be modified to form surface hydrates which are responsive to electric fields and produce a reversible change in electrorheological properties. Other components, particularly polar components, more particularly organic polar components such as surface active agents, alkanol amines such as low molecular weight alkanol amines, alkyl amines and water can in addition be used as polarization components. Such additional components which alter the polarization properties of the transition metal oxide coating and can produce field dependent fluids which are useful at elevated temperatures, including for certain fluids use above 70.degree. C. or even above 100.degree. C.

Brief Summary Text - BSTX (221):

As set forth above, the unique hollow spheres having fluid density compatibility can be coated with transition metal oxide including such additional components as set forth above. In addition, it has been found that the fluid density designed coated particles can improve the overall performance of materials that have been shown to exhibit an electrorheological effect. Thus for example, fluid density coated compatible hollow spheres can have an electronically conductive and/or polarizable surface component associated therewith, including components which are incorporated during the processing to produce such fluid density compatible materials. For example, aluminosilicates, organic polyelectrolytes, organic polyampholytes, organic semiconductors, water, polar organic compounds such as alcohols, amines, amides, polyhydroxy organic compounds and various other surfactant materials which provide a polarizable effect on the surface can be incorporated on the surface of the coated hollow sphere.

Detailed Description Text - DETX (9):

An additional alternative is to apply the $\text{SnCl}_{2.2} / \text{SnF}_{2.2}$ in an organic solvent. The solvent is then evaporated, leaving a substantially uniform coating of $\text{SnCl}_{2.2} / \text{SnF}_{2.2}$ on the fiber mats. The solvent needs to be substantially non-reactive (at the conditions of the present process) and provide for substantial solubility of $\text{SnCl}_{2.2}$ and $\text{SnF}_{2.2}$. For example, the dipping solution involved should preferably be at least about 0.1 molar in $\text{SnCl}_{2.2}$ / Substantially anhydrous solvents comprising acetonitrile, ethyl acetate, dimethyl sulfoxide, propylene carbonate and mixtures thereof are suitable. Stannous fluoride is often less soluble in organic solvents than is stannous chloride. One approach to overcoming this relative insolubility of $\text{SnF}_{2.2}$ is to introduce $\text{SnF}_{2.2}$ onto the fiber mats after the fiber mats

are dipped into the SnCl.sub.2 solution with organic solvent. Although the dopant may be introduced in the sintering section 18, it is preferred to incorporate the dopant in the coating section 14 or the equilibration section 16, more preferably the coating section 14.

Detailed Description Text - DETX (15):

In FIG. 2, a resistance heating element 50 is shown. Element 50 is schematically shown connected to electrical wires 52 and 54 so that an electrical potential can be applied across element 50, in particular across the coated substrate 56 of element 50. Referring to FIG. 3, element 50 is a flexible composite of a coated substrate 56 and a flexible, thermoplastic organic polymeric material 58. Coated substrate 56 is in the form of a glass fiber roving, a three dimensional substrate, and provides an electronically conductive path or network in element 50. As shown in FIG. 4, the individual coated fibers, illustrated by coated fiber 60, of coated substrate 56, are coated with a coating containing electronically conductive transition metal oxide, illustrated by coating 62 on glass fiber 64.

Detailed Description Text - DETX (19):

Electromagnetic shielding element 150 is a flexible composite of a coated substrate and a flexible, thermoplastic organic polymeric material. Electromagnetic shielding element 150 is structured similarly to resistance heating element 50, as shown in FIGS. 3 and 4.

Claims Text - CLTX (7):

4. The process of claim 1 wherein said transition metal oxide forming compound is selected from the group consisting of a transition metal transition metal organic salt, a transition metal organic complex and mixtures thereof.

Claims Text - CLTX (16):

13. The process of claim 11 wherein said transition metal oxide forming compound is selected from the group consisting of a transition metal chloride, a transition metal organic salt, a transition metal organic complex and mixtures thereof.